PATENT ABSTRACTS OF JAPAN

(11)Publication number : **10-050278**

(43)Date of publication of application : **20.02.1998**

(51)Int.Cl. H01M 2/08
H01M 6/16

(21)Application number : **08-203388**

(22)Date of filing : **01.08.1996**

(71)Applicant : **MATSUSHITA ELECTRIC IND CO LTD**

(72)Inventor : **NISHINO SHUICHI**
SANO AKIHIRO
OGURO HIDESUKE
OO FUMIO

(54) NONAQUEOUS ELECTROLYTE BATTERY

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a nonaqueous electrolyte battery in which battery characteristics under high temperature environment and in storage are improved.

SOLUTION: Crystalline syndiotactic polystyrene resin or a material obtained by adding polyolefin elastomer comprising polyethylene or polypropylene to crystalline syndiotactic polystyrene resin is used as a gasket material, and a nonaqueous electrolyte prepared by dissolving lithium borofluoride as a solute in an organic solvent of γ-butyrolactone alone or its mixture is used. In a battery after sealing, by specifying the compression ratio of the gasket to 30-75% in thickness, electrolyte leakage performance is enhanced.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

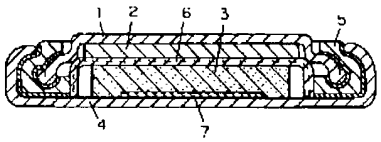
[Date of extinction of right]

JAPANESE [JP,10-050278,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

Drawing selection drawing 1



[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The nonaqueous electrolyte cell characterized by using the nonaqueous electrolyte which dissolved hoe lithium fluoride in the organic solvent which uses gamma-butyl lactone as a principal component in the nonaqueous electrolyte cell which uses a lithium as a negative-electrode active material, and uses graphite fluoride as positive active material, using crystalline syndiotactic polystyrene as a gasket which intervenes between a positive-electrode terminal and a negative-electrode terminal as a solute.
[Claim 2] The nonaqueous electrolyte cell according to claim 1 characterized by adding the polyolefine system elastomer which becomes crystalline syndiotactic polystyrene used as a gasket from polyethylene or polypropylene at 10 or less % of the weight.
[Claim 3] The nonaqueous electrolyte cell according to claim 1 or 2 which compresses into 30% thru/or 75% of thickness the gasket which uses crystalline syndiotactic polystyrene as a principal component to the thickness before compression between the positive-electrode case upper part and a negative-electrode can, and is characterized by carrying out caulking obturation.
[Claim 4] It intervenes between the negative electrode which makes a negative-electrode active material a subject, and the positive electrode which makes positive active material a subject. Average ****** the nonaqueous electrolyte which dissolved hoe lithium fluoride in the organic solvent which uses gamma-butyl lactone as a principal component as a solute as a separator which sinks in And 0.3 micrometers thru/or 1.5 micrometers, Eyes weight is 5.0 g/m2. Or claim [aperture / 9.0g/m2, and / average] 1 using glass fiber (3.0 micrometers thru/or 7.5 micrometers) thru/or a nonaqueous electrolyte cell given in three.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a nonaqueous electrolyte cell.
[0002]
[Description of the Prior Art] In recent years, the nonaqueous electrolyte cell, especially the graphite fluoride lithium cell are widely used as a memory backup power supply by excelling in the long-term preservation property of ten years or more in ordinary temperature. Recently, the activity application under hot environments is demanded by the automobile, the industrial device, etc. Moreover, even after a nonaqueous electrolyte cell is exposed to the bottom of hot environments like other electronic parts so that a solder reflow can be carried out to up to a circuit base, to be able to maintain a cell property is asked.
[0003] Although amelioration of a cell component was tried in order to fill such a demand, there was no sufficient thing.
[0004] Here, the configuration of the conventional graphite fluoride lithium cell is described. Drawing 1 shows the configuration sectional view of a coin form lithium cell (BR1225) with a diameter [of 12.5mm], and a thickness of 2.5mm as an example of the conventional graphite fluoride lithium cell. In drawing 1 , after the obturation plate with which 1 consists of stainless steel, the negative electrode with which 2 uses a lithium metal as an active material, and 3 mix an electric conduction agent and binders, such as a graphite, to graphite fluoride, the positive electrode by which application-of-pressure molding was carried out, the positive-electrode case where 4 serves as a positive-electrode terminal, the gasket, with which 5 consists of polyolefine system resin, such as polyethylene and polypropylene, the separator with which 6 consists of a polypropylene nonwoven fabric, and 7 are the charge collectors of a titanium metal. The electrolytic solution dissolves hoe lithium fluoride (LiBF4) in the solvent which mixed the dimethoxyethane of a low-boiling point solvent with gamma-butyl lactone of a high-boiling point solvent, or propylene carbonate so that it may become the solute concentration of 1.00 mols/l.
[0005] In the graphite fluoride lithium cell of the above-mentioned configuration, the negative electrode is using the lithium metal stable with heat as the active material to the melting point of 181 degrees C using the graphite fluoride active material with a positive electrode stable with heat to 450 degrees C. Moreover, lithium FURORAITO (LiF) which is a discharge product is stable with heat to 850 degrees C.
[0006] Generally a gasket with an insulating function must be installed between the metal vessel which serves as a positive-electrode terminal irrespective of the cell configuration in lithium cells, such as a coin form, a carbon button form, and a cylindrical shape, and the metal vessel which serves both as a negative-electrode terminal. A gasket has the insulating function of the metal vessel which serves as a forward negative-electrode terminal, and that a generation-of-electrical-energy element comes out to the cell exterior and the function by which sealing maintenance is carried out so that trespass to the interior of a cell of exterior air may be prevented again. However, under hot environments, with a polyolefine system gasket ingredient, a detailed gap is generated in the obturation section and the cell engine

performance deteriorates by trespass of the exterior air evaporation of the electrolytic solution, a liquid spill, and inside a cell, moisture, etc.
[0007]
[Problem(s) to be Solved by the Invention] With the configuration of the conventional coin form lithium cell shown above, there is trespass of the exterior air from the gap produced in the contact section of the gasket, the obturation plate and the gasket, and positive-electrode case which are the obturation caulking part of a cell as a cause of the cell performance degradation by elevated-temperature preservation of 85 degrees C or more to evaporation of the electrolytic solution from the interior of a cell, a liquid spill, or the interior of a cell, moisture, etc. When the boiling point like dimethoxyethane as a solvent of the electrolytic solution uses 83 degrees C and a comparatively low solvent especially, it gasifies very easily at the temperature of 83 degrees C or more, and calls in the obturation mentioned above, a solvent disperses from the detailed gap of the section to the cell exterior easily, and the cell engine performance is degraded remarkably. Moreover, when exterior air, moisture, etc. invade, also especially in the generation-of-electrical-energy element inside a cell, coats which alienate a discharge reaction on a lifting or a cone lithium front face, such as an oxide and a hydroxide, are formed in water and a chemical reaction, and the cell engine performance is reduced by the rapid increment especially in an internal resistance value.
[0008] Moreover, it insulates, when an original insulating sealing function is a separator because of complex degradation according [the polypropylene used as an ingredient of a gasket and a separator] by heat to oxidation of resin, osmosis in the interior of resin of the electrolytic solution, diffusion, etc. the time of an activity at 85 degrees C or more, or preservation in the case of a gasket, and the maintenance function of the electrolytic solution is spoiled, and the cell engine performance falls remarkably. Polypropylene resin dissolves, the above-mentioned function is lost and a gasket and a separator stop the degree of degradation becoming large, so that, as for this reduction, that environmental temperature becomes high, and showing a cell property under a 170-degree C environment.
[0009] This invention solves these conventional troubles and it aims at offering the nonaqueous electrolyte cell which has improved the activity under hot environments, or the cell property at the time of preservation.
[0010]
[Means for Solving the Problem] This invention in order to solve said conventional technical problem Light metals, such as a lithium, sodium, and magnesium, In the nonaqueous electrolyte cell which uses as positive active material halogenides, such as negative-electrode active material [which consists of an alloy of these light metals], oxidization copper, molybdenum-trioxide, manganese-dioxide, graphite, etc. fluoride, or between a positive-electrode terminal and a negative-electrode terminal The nonaqueous electrolyte which dissolved hoe lithium fluoride in the organic solvent which uses gamma-butyl lactone as a principal component as a solute is used, using crystalline syndiotactic polystyrene resin as an intervening gasket.
[0011] And by making it the above configuration, since it can aim at prevention of a liquid spill immediately after this invention prevents generating of a detailed gap [in / for a cell / an obturation caulking part], and plans thermal stability of the electrolytic solution and can set it at the time of obturation, when [under hot environments] using or saving, it can secure much more improvement in liquid spill-proof nature, and can offer the cell which was excellent in the cell property.
[0012]
[Embodiment of the Invention] This invention can be operation-ized by using the nonaqueous electrolyte which dissolved hoe lithium fluoride in the organic solvent which uses gamma-butyl lactone as a principal component as a solute, using crystalline syndiotactic polystyrene as a gasket which intervenes between a positive-electrode terminal and a negative-electrode terminal in the nonaqueous electrolyte cell according to claim 1 which uses a lithium as a negative-electrode active material, and uses graphite fluoride as positive active material like. And the cell which carried out this invention has a good elevated-temperature property, when [under hot environments] using or saving, the electrolytic

solution does not spill liquid from a caulking part, and what was excellent in the cell property can be realized.
[0013] And like, this invention can realize the cell which demonstrates the cell engine performance equivalent to the cell according to claim 2 using the gasket made from a crystalline syndiotactic polystyrene simple substance, even if it adds a polyolefine system elastomer at 10 or less % of the weight to the gasket made from crystalline syndiotactic polystyrene.
[0014] Moreover, the gasket according to claim 3 which uses crystalline syndiotactic polystyrene as a principal component can operation-ize the good cell of especially liquid spill-proof nature like by making thickness by the compression obturation before and after obturation 30% thru/or 75%.
[0015] Moreover, for a separator [in / like / the cell of this invention] according to claim 4, average ****** sets 2 micrometers or less to 0.3 micrometers thru/or 1.5 micrometers preferably, and eyes weight is 5.0 g/m2. Or if 9.0 g/m2 and an average aperture use glass fiber (3.0 micrometers thru/or 7.5 micrometers),-izing of the cell which fully demonstrated the cell property of this invention can be carried out [****].
[0016]
[Example] The example of this invention is explained below, referring to a drawing.
[0017] As an example 1, the positive electrode used crystalline syndiotactic polystyrene according [fluoride / graphite / a gasket] a lithium metal to this invention in a negative electrode, and the electrolytic solution assembled the cell of the same configuration as the former which shows hoe lithium fluoride to a separator at drawing 1 using glass fiber using what was dissolved l. 1.00 mols /to gamma-butyl lactone.
[0018] And the thing of the same configuration as the example 1 of this invention was assembled as an example of a comparison except having used polypropylene resin for the gasket and the separator ingredient.
[0019] This cell performed the 150-degree C retention test. The open circuit voltage of BR1225 cell in 150-degree-C retention test and change of internal resistance are shown in a table 1.
[0020]
[A table 1]

	本発明の実施例		比較例	
特性 / 期間	電圧 (V)	内部抵抗 (Ω)	電圧 (V)	内部抵抗 (Ω)
保存前	3.40	45	3.40	45
10日	3.40	78	3.39	85
20日	3.40	117	3.20	150
30日	3.38	126	3.05	390
40日	3.38	142	2.95	850

[0021] As mentioned above, in the example of a comparison, lowering of open circuit voltage and lifting of internal resistance are remarkable, and it is shown that the cell engine performance is [in / there is little the change and / the preservation under hot environments] stable in the example 1 of this invention as a 150-degree C retention period passes.
[0022] Next, the liquid spill-proof property at the time of adding the polyolefine system elastomer which becomes crystalline syndiotactic polystyrene of a gasket ingredient from polyethylene or polypropylene was evaluated.
[0023] Except having added polypropylene at 2 % of the weight to the gasket, the cell made the same configuration as an example 1 is made into the example 2 of this invention, weight % of the polypropylene added to a gasket below is made into 4%, 6%, 8%, 10%, 12%, and 15%, and what was

h g cg b eb cg e e

considered as the same configuration as an example 1 is made into an example 3, an example 4 an example 5, an example 6, an example 7 and example 8 except it And 120 cycles of spalling tests which make the above-mentioned cell for -10-degree-C 1 hour, and make 1 cycle 125-degree-C 1 hour are carried out, and the result of having investigated the liquid spill-proof property is shown in a table 2.
[0024]
[A table 2]

ポリプロピレン添加量		熱衝撃試験 (漏液電池個数／テスト電池個数)
実施例 1	0重量%	0／20
実施例 2	2重量%	0／20
実施例 3	4重量%	0／20
実施例 4	6重量%	0／20
実施例 5	8重量%	0／20
実施例 6	10重量%	0／20
実施例 7	12重量%	2／20
実施例 8	15重量%	5／20

[0025] Even if it adds 10 % of the weight for a polypropylene elastomer as an upper limit so that more clearly than a table 2, a liquid spill-proof property equivalent to the cell which used the gasket of a crystalline syndiotactic polystyrene simple substance is shown. Here, although the example of a polypropylene elastomer was shown, the result with the same said of a polypropylene elastomer is obtained. It is possible not only a crystalline syndiotactic polystyrene simple substance but to use the crystalline syndiotactic polystyrene resin which added the polyolefine system elastomer which consists of polypropylene or polyethylene as a gasket ingredient, and a polyolefine system elastomer addition has 10 or less % of the weight more desirable than this in this case.
[0026] Next, comparison examination of the optimal compressibility of the gasket in the case of obturation of the cell by the caulking part was carried out, using crystalline syndiotactic polystyrene resin as a gasket ingredient.
[0027] The cell considered as the same configuration as an example 1 is made into an example 9 except having made gasket compressibility into 20%. Hereafter, gasket compressibility is made into 30%, 50%, 75%, 80%, and 90%, and what was considered as the same configuration as an example 1 is made into an example 10, an example 11, an example 12, an example 13, and an example 14 except it. And 120 cycles of spalling tests which make the above-mentioned cell for -10-degree-C 1 hour, and make 1 cycle 125-degree-C 1 hour are carried out, and the result of having investigated the liquid spill-proof property is shown in a table 3.
[0028]
[A table 3]

ガスケット圧縮率		熱衝撃試験 (漏液電池個数／テスト電池個数)
実施例 9	20%	3／20
実施例 10	30%	0／20
実施例 11	50%	0／20
実施例 12	75%	0／20
実施例 13	80%	2／20
実施例 14	90%	5／20

[0029] If the compressibility of the gasket at the time of obturation is 30% thru/or 75% when using crystalline syndiotactic polystyrene resin as a gasket ingredient so that more clearly than a table 3, it turns out that a liquid spill is not generated but liquid spill-proof nature is satisfied. Also in the case of resin which added the above-mentioned polyolefine system elastomer to crystalline syndiotactic polystyrene resin, the same result was obtained by this result.
[0030]
[Effect of the Invention] The nonaqueous electrolyte cell of this invention can offer the outstanding cell with very little the activity under hot environments or degradation of the cell engine performance in preservation more clearly than the above explanation like. An activity or preservation is possible for this invention at wide range temperature, it can expand the activity application of a nonaqueous electrolyte cell further, and a large thing has the industrial value.

[Translation done.]